

SEASONAL BREEDING
IN THE EASTERN QUOLL DASYURUS VIVERRINUS
(MARSUPIALIA : DASYURIDAE)

by

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**A thesis presented for the Degree of Doctor of Philosophy,
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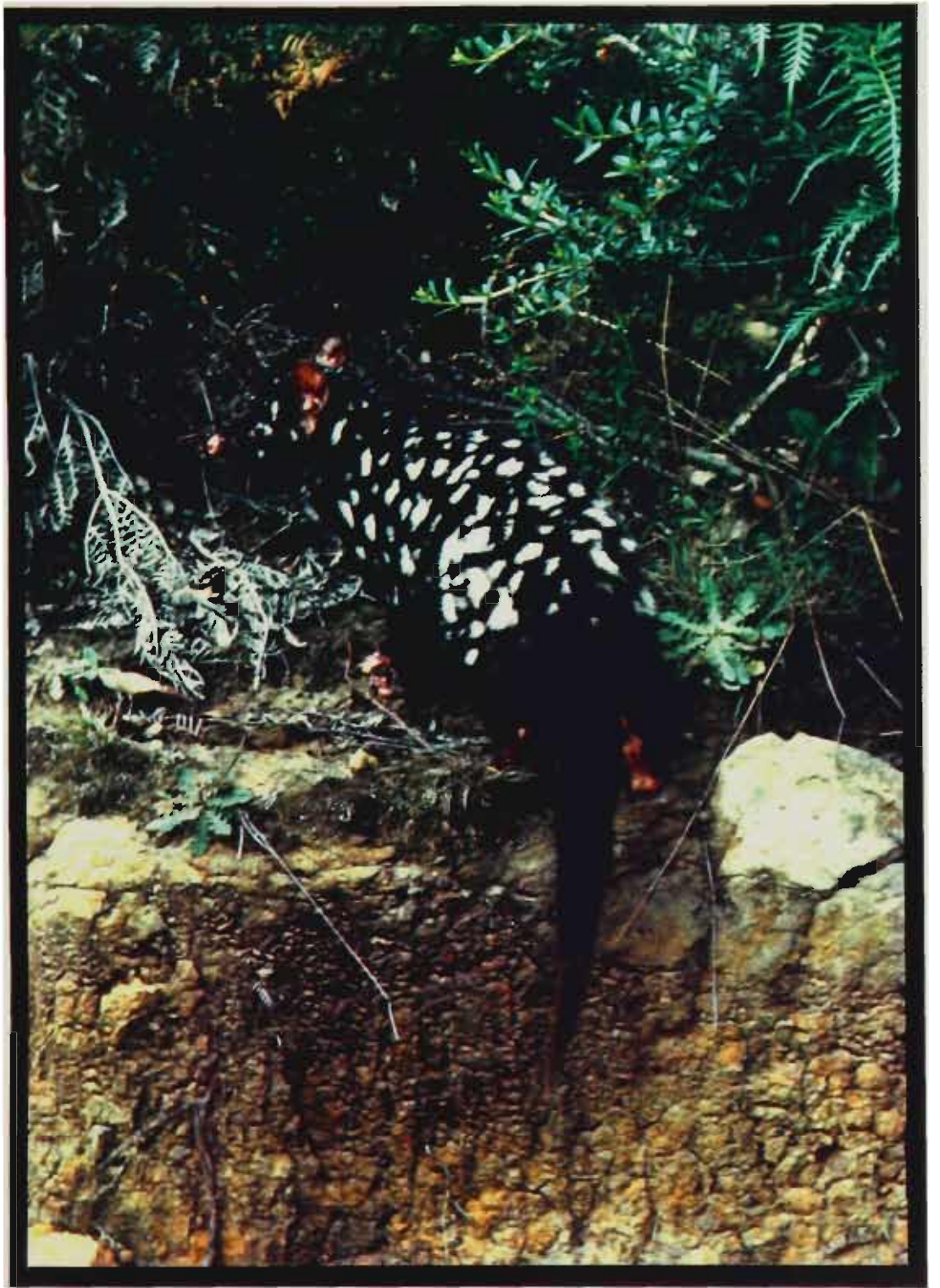


Plate 1a : A black Eastern quoll, *Dasyurus viverrinus*.

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A handwritten signature in cursive script that reads "Sally Bryant". The signature is fluid and elegant, with a long horizontal stroke at the end of the word "Bryant".

Sally L Bryant

ABSTRACT

The Eastern quoll, *Dasyurus viverrinus*, is one of the larger members of the family Dasyuridae and is found only in Tasmania. The quoll has a short breeding period with mating occupying two to three weeks of every year. Males display seasonal cycles of body weight and testes size. Both parameters are maximal prior to breeding then decline during and after mating.

LH and testosterone concentrations fluctuate at basal levels for much of the year. A gradual rise in LH and testosterone occurs in April, two to three months before breeding. This probably functions to initiate spermatogenesis and to prepare the gonads and accessory glands for reproduction. Male quoll produce a peak in LH (mean 13.9 ng per ml) and testosterone (mean 5.0 ng per ml) during the mating period. This peak coincides with maximum number of animals in the area and is associated with an increase in activity and mobility of males at this time. The highest testosterone level occurs just prior to mating and declines during copulation. By the time the young are born, approximately 19 days after copulation, most males have basal levels of hormones.

Juvenile quoll increase in weight with age and have comparatively high levels of LH and testosterone when entering the population after weaning. These levels may be associated with the processes of maturation and also with agonistic behaviour encountered during dispersal.

LH, progesterone and prolactin secretion in the female quoll conform to the patterns shown by other marsupials. LH and progesterone levels are highest near the time of oestrus and ovulation while prolactin concentration increases throughout the lactation period. The endocrine cycles and pouch development of pregnant and non-pregnant females appear to be similar.

Experimental evidence suggests that photoperiod is the likely proximate cue regulating the breeding cycle of the male quoll. Males exposed to a long daylength increase in weight and have lower LH concentrations compared to control animals. Testosterone secretion and testes size appear unaffected by a change in photoperiod and may require either a longer exposure time or additional factors to influence these cycles.

Males in captivity generally have lower LH and testosterone levels compared to males in the wild. The hormonal profiles of captive male quoll are related to the degree of physical contact with the female. When males are housed with females, LH and testosterone levels are significantly higher than when males are housed near, or isolated from females. A cue from the female may be the stimulus initiating a peak in androgens in the male and therefore females may be responsible for the synchrony of the breeding cycle.

Cortisol levels are significantly lower in captive animals when physical contact is prevented. There is no evidence of an androgen dependent decrease in plasma CBG during breeding nor is there any increase in free cortisol associated with a decrease in MCBC. The breeding season did not appear to be a period of high stress nor was it characterised by major changes in plasma protein, albumin or triglyceride levels. This is consistent with the Eastern quoll being one of the long lived members of the Dasyuridae.

This project proposes that the seasonal breeding activity in the male quoll is broadly regulated by photoperiod. However, the androgen rise prior to mating is triggered by additional cues, mainly from the female. The synchrony of this rise is directly related to interspecific male aggression probably involving physical interaction. High androgen levels occur just before mating, enabling males to establish their dominance and position in the social hierarchy before pairing with females. This reproductive pattern enables the Eastern quoll to intensify its reproductive effort and the relatively short, sharp rise in androgens and free cortisol does not impose immediate constraints on the life expectancy of the animal. The role of the male throughout the breeding cycle therefore contributes much to the life history classification of this species.

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